



DEPARTMENT OF THE ARMY
LONE STAR ARMY AMMUNITION PLANT
TEXARKANA, TEXAS 75501

Mr. Hodgson/djm/AUTOVON
829-1305

REPLY TO
ATTENTION OF
SARLS-EN

21 Sep 82

SUBJECT: MMT Project 5804487, Develop Dual Purpose M42/MLRS Grenade/Fuze
Assembly Capability

AD A120217

Commander
US Army Munitions Production
Base Modernization Agency
ATTN: SARPM-PBM-LS (Rich Smolen)
Dover, NJ 07801

Inclosed are prove out test observations and their analysis as provided by Day and Zimmermann.

It is the opinion of this office that the equipment is functional and is acceptable for production use.

FOR THE COMMANDER:

1 Incl
as

JERRY MELITO, P.E.
Chief, Engineering Division

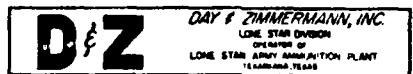
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DRDAR-QAR-Q (J. Shim)
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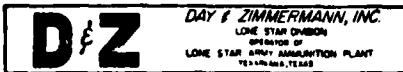


PROVE OUT

TEST ANALYSIS REPORT

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SUMMARY SHEET

PROVE OUT TEST ANALYSIS

1. Equipment Tested: Dual Purpose (M42/46 and XM77) Grenade/Fuze Assembly Machine
2. Project Number: 5804487
3. Contractor: Day & Zimmermann, Inc.
Texarkana, Texas 75501
4. Test Dates: August 17 - 19, 1982
5. Location of Test: Lone Star Army Ammunition Plant
Texarkana, Texas 75501
6. Test Results: See Test Summary (Table A) on the following page.

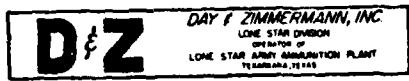
During the Prove-Out Test, it was also satisfactorily demonstrated that the Grenade/Fuze Assembly machine can be converted from XM77 mode to M42/46 mode in less than eight (8) hours.

D&Z DATA-ZIMMERMAN INC.
DATA SYSTEMS
DATA COMMUNICATIONS

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TEST SUMMARY

OPERATION DESCRIPTION	MTBF (min)		MTTR (min)		INHERENT AVAILABILITY (%)		REJECT RATE (%)		PROD. RATE (PPM)
	Reqd.	Actual	Reqd.	Actual	Reqd.	Actual	Limit	Actual	
Grenade/Fuze Assembly									
a) XM77 Mode	3.46	5.76	0.92	0.95	80.0	85.9	4.0	0.9	24.75
b) M42/46 Mode	3.46	6.6	0.92	1.13	80.0	85.4	4.0	-	24.17



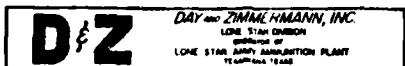
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4. Data Analysis.
5. Concluding Remarks.

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Test Data



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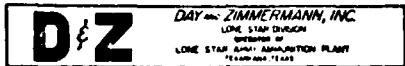
I. INTRODUCTION

The Prove-Out test on Dual Purpose Grenade/Fuze (M42/46 and XM77) Assembly was conducted at Lone Star Army Ammunition Plant.

The Prove-Out test was conducted August 17 through 19, 1982.

On August 17, 1982 the first part of the test was conducted in XM77 Mode. Then, on the next day, (August 18, 1982) the machine was changed over to M42/M46 Mode, and on August 19, 1982 the remaining of the test was completed.

The machine on which this Prove-Out was conducted was an existing machine at LSAAP. The machine was modified according to the scope of work, MMT Project 5804487, such that the machine will be able to assemble M42/46 as well as XM77 Grenades for MLRS.



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II. SYSTEM DESCRIPTION

The loaded grenade bodies are received at the Automatic Body Assembly System's untraying machine.

The trayed grenade bodies are manually removed from buggies and fed to the untraying machine. At this point the grenades are automatically removed from the trays and fed onto the infeed conveyor of the assembly machine. Grenade bodies are automatically picked up from infeed conveyor and placed on pallet of the assembly machine.

Grenades are automatically oriented to accept fuze assembly and are locked in position.

Fuzes for M42/46 or XM77 are delivered to the fuze-body assembly system as required.

Trayed fuzes are manually placed in automatic untraying machine. The untraying machine automatically removes fuzes from trays and feeds them into the Fuze Gage Station.

Fuze firing pin and the position of arming screw weight is automatically gaged. Accepted fuzes are automatically fed into the Fuze Placing Station of the Body Assembly System (this gaging operation runs slightly faster than the assembly machine to compensate for a reasonable number of rejects).

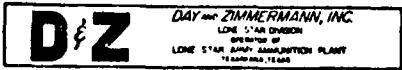
Assemble fuze to body - The fuzes are automatically positioned over studs on grenade body.

Fuze orient check - The following checks are automatically performed to insure proper positioning of fuze on body.

A. Orientation of fuze

B. Presence and position of spiral pin

Clinch fuze - The body studs are automatically staked to fasten the fuze assemblies to the body (staking pressure is regulated and monitored by means of a hydraulic control system).



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Washer Feed - The washers are automatically fed on to the tape fixture, two fixtures at a time, from a Vibratory Syntron.

Next to the tape (along with the tape stiffener in the case of the M42/46 Grenades) is manually placed on the fixture.

The staking fixture with tape/tape stiffener assembly is automatically positioned over the arming screw of the fuze.

The tape/tape stiffener assembly is automatically clinched to the rivet end of fuze arming screw (staking pressure is regulated by a hydraulic Control System).

The staking fixture is removed from the assembly machine and recirculated for placement of more tape stiffener assemblies.

The grenade assemblies with tape stiffener assembly, are conveyed to the tape stiffener winding fixtures where the tape stiffener assemblies are automatically wound.

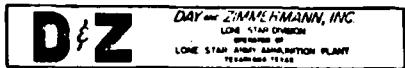
In the case of the XM77 Grenade, the machine also automatically puts a stabilizer, after the tape is wound, for the retention of the tape.

The grenade assembly is now complete and automatically removed from the assembly machine and placed on outfeed conveyor to be carried to traying station where the accepted grenades are trayed and placed in buggies for move to lot acceptance holding building as required.

Each Automatic Body Assembly System operates at a machine rate of 30 ppm.

III. TEST PROCEDURE AND REQUIREMENTS

1. (a) The Prove-Out involved conducting of the test on the Grenade/Fuze Assembly Machine in two (2) different modes.
 - 1) XM77 Mode
 - 2) M42/46 Mode



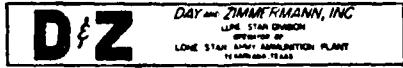
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- (b) Duration of test in each Mode was to be approximately 400 minutes (i.e. one (1) shift).
- (c) After the test in one Mode is complete, the machine was to be changed over to the other Mode and the remaining of the test conducted.
- (d) During each Mode of the test, the machine was supposed to cycle at a minimum rate of 30 ppm, and demonstrate and availability of 80%. In other words, accumulated downtime for all corrective and preventive maintenance actions, during each Mode, was not to exceed 80 minutes during an actual test time of 400 minutes.
- (e) During each Mode of the test, the machine was to demonstrate an MTBP of 3.46 minutes and an MTTR of 0.92 minutes.
- (f) The change over time from one Mode to another was not to exceed 8 hours.
- (g) The reject (scrap) rate was not to exceed 4% of the production.
- (H) During the test, live grenades were to be produced.

2. As per the understanding between the Project Manager's office and the Project Engineer, Don Bateson of Day & Zimmermann, Inc., the preventive and corrective maintenance actions which were to be considered as downtime were to be just confined to the MLRS modifications done to the machine. Any other downtime, outside the MLRS modifications, were to be considered as administrative downtime.

As such, the maintenance actions with respect to the following will only be considered as downtime.

- (1) Washer Feed Station
- (2) Tape Fixture Assembly
- (3) Tape Winder



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(4) Tape Stripper Station

(5) Retention of Tape Stabilizer After Fold

IV. DATA ANALYSIS

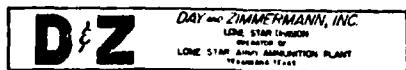
The RAM data during the test was collected in accordance with the format of DRDAR-QA Form 438.

The analysis of the test results are tabulated on the following page (Table B).

The formula used in arriving at the various parameters are presented within the respective parenthesis.

The parameters (MTBF, MTTR, Inherent Availability) were calculated for the system which was within the scope of MLRS modification, (See Section III, paragraph 2).

Also, during the Prove-Out test, it was demonstrated that the conversion of the machine from XM77 Mode to M42/46 Mode takes a time duration of about four (4) hours. The requirement being eight (8) hours.

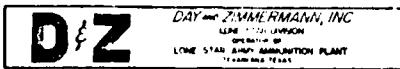


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DATA ANALYSIS RESULTS

	XM77 Mode	M42/46 Mode
A. Scheduled test time	415 min	415 min
B. Administrative downtime	16 min	--
C. Downtime outside the scope of MLRS modification	77 min	143.34 min
D. Downtime within the scope of MLRS modification	45.46 min	39.51 min
E. Scheduled uptime (a-b-c-)	322 min	271.66 min
F. Actual uptime (e-d)	276.54 min	232.15 min
G. Total number of units produced	8042	6565
H. Rejects	73	--
I. Reject rate	0.9%	--
J. Acceptable units produced	7969	6565
K. Production rate (i/e)	24.75 ppm	24.17 ppm
L. Number of failures within the scope of MLRS modification	48	35
M. MTBF (e-d/k)	5.76 min	6.6 min
N. MTTR (d/l)	0.95 min	1.1 min
O. Inherent availability	85.88%	85.38%

Table-B



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DOWNTIME ANALYSIS OF GRENADE/FUZE ASSEMBLY MACHINE

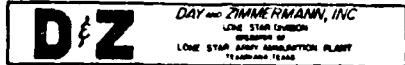
1. XM77 Mode

(a) Outside the scope of modifications

NO	Station/Problem	Frequency	Total Time	Average Time
1	Fuze Feed	40	58.38 min	1.46 min
2	Fixture fail to retract	27	8.96 min	0.33 min
3	Body Placing Station	4	2.25 min	0.56 min
4	Grenade Removal Station	4	1.90 min	0.48 min
5	Grenade conveyor	3	2.50 min	0.83 min
6	Fixture failed to go into station	2	1.52 min	0.76 min

(b) Within the scope of modifications

1	Ribbon Winder	15	12.35 min	0.82 min
2	Clip Feed	25	30.40 min	1.22 min
3	Washer Feed	8	2.71 min	0.34 min



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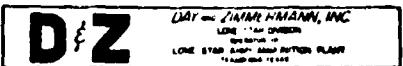
2. M42/46 Mode

(a) Within the Scope of Modifications.

NO.	STATION/PROBLEM	FREQUENCY	TOTAL TIME	AVERAGE TIME
1	Ribbon Winder	18	26.40 min	1.47 min
2	Clip Feed	6	6.02 min	1.00 min
3	Washer Feed	8	3.73 min	0.47 min
4	Misc	2	3.36 min	1.68 min

(b) Outside the Scope of Modifications

1	Fuze Feed	119	105.47 min	0.89 min
2	Fixture failed to retract	28	13.95 min	0.50 min
3	Grenade Removal Station	6	3.80 min	0.63 min
4	Fixture failed to go into Station	4	1.97 min	0.49 min
5	Body Feed Conveyor	4	4.32 min	1.08 min
6	Stuck Grenade on belt	4	1.65 min	0.41 min
7	Grenade fell on conveyor	4	1.75 min	0.44 min
8	No Body	2	0.79 min	0.40 min
9	Worked on pallets	2	3.75 min	1.86 min
10	Body Placing Station	1	0.30 min	0.30 min
11	Body Orienting Station	1	0.99 min	0.99 min
12	Changed Punches	1	2.85 min	2.85 min
13	Outfeed Conveyer got jammed	1	0.60 min	0.60 min



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CONCLUDING REMARKS

The Dual Purpose Grenade/Fuze Assembly machine met all the test requirements, (see Test Summary - Table A) except that the machine demonstrated an MTTR of 0.95 minutes and 1.13 minutes in XM77 and M42/M46 Modes respectively, while the requirement was 0.92 minute. The difference being very marginal.

In interpreting the results of the Data Analysis, however, the following points should also be noted:

- 1) The existing Grenade/Fuze Assembly machine which was picked for the modification was not under production for a long time.
- 2) The machine was, as far as the test was concerned, was debugged with respect to the modifications only.
- 3) Most of the downtime outside the scope of modifications was due to the Fuze Feed Station. This in no way reflects the actual capability of this Station. During M42 line prove out, it was demonstrated that this Station was more than capable of meeting the requirements. Much of the problem with this Station, which was not in production for a long time, was due to sticking control valves.
- 4) Also during the test, it was found that the studs on the grenade bodies were having burrs which was causing jams on the Station when the Station was trying to place the fuze on the grenade body.

R.A.M. DATA

PLACE B-4, 8W, LSAAP	OPERATION M42 Grenade/Fuze Assembly			PROCESSED 6565		POUNDS PARTS X OTHER	
	PAGE <u>1</u> OR <u>13</u>	STATION NO.	TIME START OF SHIFT <u>07:27</u>	TIME END OF SHIFT <u>15:27</u>	RATE 30 DPM		REJECTS 0
DATE <u>8/19/82</u>					REMARKS		EQUIPMENT FAILURE CODE
DATE <u>8/19/82</u>	EVENT TIME	EVENT CODE	DURATION MIN. SEC. (100)			MP	
8/19/82	727	3	1 . 18	Ribbon winder			
	729	3	50	Ribbon winder			
	730	3	1 . 65	Switch malfunction			
	732	3	9 . 85	Ribbon winder			
	743	3	4 . 01	Ribbon winder			
	748	3	2 . 80	Clip feed			
	750	6	1 . 90	Fuze feed			
	753	6	55	Fixture retract			
	754	6	1 . 03	Fuze feed			
	755	6	40	Fuze feed			
	756	3	90	Clip feed			
	758	3	70	Ribbon winder			
	759	6	77	Fuze feed			
	800	6	55	Fixture retract			
	801	6	1 . 03	Fuze feed			
	802	6	42	Fuze feed			
	803	3	98	Ribbon winder			
	805	3	23	Ribbon winder			

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE

6. ADMINISTRATIVE (STATE REASON)
7. ARRACOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE	B-4 LSAAP	OPERATION			PROCESSED			POUNDS PARTS OTHER	REJECTS
		TIME	START OF SHIFT	END OF SHIFT	TIME	RATE	ACCEPT		
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS			MP	EQUIPMENT FAILURE CODE	
8/19/82	805	3	25	Ribbon winder					
	806	3	60	No fixtures - washer feed problem					
	808	3	15	Ribbon winder					
	809	3	44	Ribbon winder					
	809	6	14	50 Fuze feed (transfer)					
	825	6	75	Fuse feed (transfer)					
	826	3	1	35 Switch malfunction					
	830	3	40	No fixtures - washer feed problem					
	830	6	60	Fuze feed					
	831	3	92	Ribbon winder					
	833		30 ppm						
	835	6	31	Fuze feed					
	835	6	30	Fuze feed transfer					
	836	6	92	Fuze feed transfer					
	837	6	25	Grenade take off station					
	843	6	75	Fixture retract					
	844	6	20	Fixture retract					
	847	3	30	Ribbon winder					

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST
5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

DRDAR-QA FORM 438

SIGNATURE _____

PRINTED NAME _____

R.A.M. DATA

PLACE B-4 PAGE <u>3</u> OR <u>13</u>	STATION NO. LSAAP	OPERATION		PROCESSED		POUNDS	
		TIME START OF SHIFT	TIME END OF SHIFT	TIME	TIME	RATE	ACCEPT
8/19/82	852	6		5.5	Fuze feed		
	853	3	1	05	Ribbon winder		
	857	6		31	Fixture retract		
	858	6		30	Fixture retract		
	859	6		22	Fixture retract		
	902	6		78	Fuze feed transfer		
	903	6		50	Fixture retract		
	903	6		30	Fixture retract		
	904	6		30	Grenade pick up station		
	905	3		50	Station #1 (ribbon winder)		
	907	6		30	Fixture retract		
	909	6	2	80	Worked on pallets		
	912	6		40	Fuze fixture retract		
	915	6		80	Fuze feed		
	916	3		30	Ribbon winder		
	917	6		40	Fixture retract		
	918	6		36	Fuze feed		
	919	6		50	Fixture failed to go into station		

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

DDAR - QA FORM 4B

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADM RESERVE
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE B-4	LSAAP	OPERATION		TIME		TIME		PROCESSED		POUNDS	
		M42 Grenade/Fuze Assembly		START OF SHIFT		END OF SHIFT		RATE		ACCEPT	
PAGE <u>4</u> OR <u>13</u>	STATION NO.	EVENT TIME	EVENT CODE	MIN.	SEC.	MIN.	SEC.	MP		EQUIPMENT FAILURE CODE	
8/19/82		920	6		95						
		925	6		40						
		925	6		50						
		927	6		25						
		929	6	1	15						
		930	2	15	00						
		945	6		95						
		946	6		75						
		948	6	2	92						
		951	6		80						
		952	6		30						
		954	6		45						
		955	6	1	15						
		956						30 ppm			
		959	3		18						
		1000	6		45						
		1001	3		30						
		1003	3	1	10						

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRACOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

ORDAR-QA FORM 458

SIGNATURE _____

PRINTED NAME _____

R.A.M. DATA

PLACE B-4 PAGE 5 OF 13	OPERATION M42 Grenade/Fuze Assembly	PROCESSED				POUNDS PARTS OTHER	
		TIME START OF SHIFT	TIME END OF SHIFT	RATE	ACCEPT	REJECTS	
DATE	EVENT TIME	EVENT CODE	DURATION MIN.	SEC.	REMARKS	MP	EQUIPMENT FAILURE CODE
8/19/82	1007	6		20	Tape fixture retract		
	1011	3		45	No fixtures - washer feed problem		
	1015	6		50	Fixture failed to go into station		
	1017	6		35	Stuck grenade on belt		
	1019	6		15	Fixture retract		
	1019	6		35	Fuze feed		
	1023	6		50	Fuze feed		
	1025	6		45	Fuze feed		
	1027	6		42	Fuze feed		
	1030	6	2	38	Fuze feed		
	1033	6		40	Body infeed conveyor		
	1035	6		42	Tape fixture failed to go into station		
	1036	6		30	Fuze feed (no fuze)		
	1037	6		99	Body operating station		
	1040	6		47	Fuze feed		
	1041	3		50	Clip feed		
	1042	6		35	Fuze feed		

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

ORDAR-QA FORM 488

SIGNATURE _____
 PRINTED NAME _____

R.A.M. DATA

EVENT CODES	1. END OF SHIFT 2. BREAK/LUNCH 3. CORRECTIVE MAINTENANCE 4. END OF TEST
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ENTERTAINMENT WEEKLY

PRINTED NAME

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R.A.M. DATA

PLACE B-4	LSAAP	OPERATION			PROCESSED			POUNDS	
		PAGE <u>7</u> OR <u>12</u>	STATION NO.	TIME	TIME	RATE	ACCEPT	PARTS OTHER	REJECTS
DATE	EVENT TIME	EVENT CODE	DURATION MIN. SEC.	REMARKS			EQUIPMENT FAILURE CODE		
8/19/82	1201	3	1	40	Ribbon winder				
	1203	3		36	Grenade fell				
	1203	3		74	Ribbon winder				
	1205	6	2	90	Fuze feed (no fuze)				
	1208	3		25	Clip feed				
	1210	6		90	Fuze feed (no fuze)				
	1212	6		60	Body conveyor (infeed)				
	1216	6	2	85	Change punches				
	1222	6		22	Tape fixture retract				
	1225	3		65	Clip feed				
	1226	6		35	No fuze				
	1228	6		35	No fuze				
	1231			30	ppm				
	1232	6	1	35	No fuze				
	1236	6		31	No body in station				
	1237	6		35	No fuze				
	1240	6		65	No fuze				
	1241	6		52	No fuze				

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADMCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE B-4 LSAAP	OPERATION M42 Grenade/Fuze Assembly			PROCESSED		POUNDS PARTS OTHER		
	PAGE 8 OF 13	STATION NO.	TIME START OF SHIFT	TIME END OF SHIFT	RATE	ACCEPT	REJECTS	
DATE	EVENT TIME	EVENT CODE	DURATION MIN. SEC.	REMARKS			M P	EQUIPMENT FAILURE CODE
8/19/82	1242	6	47	No fuze				
	1243	6	60	No fuze				
	1244	6	61	No fuze				
	1245	6	2 01	No fuze				
	1247	6	1 62	No fuze				
	1250	6	10 50	No fuze, - fuze conveyor				
	1302	6	1 55	No fuze				
	1305	6	37	No fuze				
	1306	6	55	No fuze				
	1306	6	50	No fuze				
	1307	6	1 70	No fuze				
	1308	6	70	No fuze				
	1310	6	61	No fuze				
	1311	6	3 20	No fuze				
	1315	6	45	No fuze				
	1315	6	75	No fuze				
	1316	6	20	No fuze				
	1317	6	1 10	No fuze				

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE

6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE B-4	LSAAP	OPERATION			PROCESSED			POUNDS PARTS OTHER
		TIME		TIME	RATE	ACCEPT	REJECTS	
PAGE <u>9</u> OR <u>13</u>	STATION NO.	START OF SHIFT	END OF SHIFT	EQUIPMENT FAILURE CODE			MP	
DATE	EVENT TIME	EVENT CODE	DURATION	MIN.	SEC.	REMARKS		
8/19/82	1318	6		3	05	No fuze		
	1321	6			30	No fuze		
	1322	6			48	No fuze		
	1323	6			30	No fuze		
	1327	6			85	No fuze		
	1328	6			30	No fuze		
	1330	2		15	00	Break		
	1345	6			20	No fuze		
	1346	6			25	No fuze		
	1349				30	ppm		
	1350	6			45	No fuze		
	1350	6			37	No fuze		
	1351	6			20	Tape fixture retract		
	1354	6			21	Grenade fell		
	1355	6			45	No fuze		
	1355	6			35	No fuze		
	1358	6			50	No fuze		
	1400	6			40	No fuze		

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE

6. ADMINISTRATIVE (STATE REASON)
7. ARRDCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

ORDAR-QA FORM 438

SIGNATURE _____
 PRINTED NAME _____

R.A.M. DATA

PLACE B-4	LSAAP	OPERATION		PROCESSED		POUNDS	
		PAGE <u>10</u> or <u>13</u>	STATION NO.	TIME	TIME	RATE	PARTS OTHER
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS	MP	EQUIPMENT FAILURE CODE	
8/19/82	1401	6	48	No body in station			
	1402	6	59	No fuze			
	1403	6	33	No fuze			
	1405	6	29	No fuze			
	1405	6	27	Fixture retract			
	1406	6	45	No fuze			
	1409	6	47	No fuze			
	1410	6	31	No fuze			
	1410	6	45	No fuze			
	1414	6	70	Fixture retract			
	1415	6	33	Fixture retract			
	1416	6	35	No fuze			
	1417	6	47	No fuze			
	1418	6	05	No fuze			
	1419	6	30	Fixture retract			
	1422	6	45	Fallen grenade			
	1424	6	62	No fuze			
	1425	6	85	No fuze			

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE

6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE B-4	LSAAP	OPERATION				PROCESSED		POUNDS	
		M42 Grenade/Fuze Assembly		TIME	TIME	RATE	ACCEPT	PARTS	OTHER
PAGE <u>11</u> OF <u>13</u>	STATION NO.	START OF SHIFT	END OF SHIFT	REMARKS	REJECTS				
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS	REJECTS				
			MIN. SEC.						
8/19/82	1425	6		35	No fuze				
	1427	6	1	18	No fuze				
	1429	6	2	35	No fuze				
	1432	6		30	No fuze				
	1434	6		22	Fixture retract				
	1435	6		35	Fixture retract				
	1436	6		48	Grenades hung in conveyor				
	1437	6		32	Grenades hung in conveyor				
	1438	6		85	No fuze				
	1440	6		28	No fuze				
	1440	6		47	No fuze				
	1445	6		25	No fuze				
	1445	6		65	No fuze				
	1446	6		70	Dropped grenade at body placing station				
	1447	6		55	Fuze feed				
	1449	6		40	Fuze feed				
	1450	6	1	50	Fuze feed				
	1450	6		35	Fuze feed				

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE <u>PAGE 12 or 13</u>	B-4 LSAAP	OPERATION		TIME		TIME		PROCESSED		POUNDS	
		STATION NO.	M42 Grenade/Fuze Assembly	START OF SHIFT	END OF SHIFT	RATE	ACCEPT	PARTS	OTHER	REJECTS	
DATE	EVENT TIME	EVENT CODE	DURATION	MIN.	SEC.	REMARKS		M.P.	EQUIPMENT FAILURE CODE		
8/19/82	1451	6		85		No fuze					
	1453	6		30		No fuze					
	1454	6		30		No fuze					
	1455	6		50		Outfeed conveyor (grenades jammed)					
	1456	6		25		No fuze					
	1457	6		40		No fuze					
	1458	6		45		No fuze					
	1459	6		30		No fuze					
	1500	6		25		Fixture retract station					
	1504	6		60		Outfeed conveyor jammed					
	1505	6		55		No fuze					
	1506	6		60		No fuze					
	1508	6		80		No fuze					
	1511	6		25		No fuze					
	1512	6		30		No fuze					
	1513	6		55		No fuze					
	1515	6		1		No fuze					
	1516	6		20		No fuze					

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE _____
PRINTED NAME _____

R. A. M. DATA

EVENT CODES	1. END OF SHIFT 2. BREAK/LUNCH 3. CORRECTIVE MAINTENANCE 4. END OF TEST
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B C E
2. 3. 4.

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE PAGE <u>2</u> OR <u>10</u>	STATION NO.	OPERATION			PROCESSED			POUNDS	
		TIME		TIME	RATE		ACCEPT	PARTS	OTHER
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS		MP	EQUIPMENT FAILURE CODE		
				MIN.	SEC.				
8/17/82	803	3		65		Ribbon winder			
	804	3	1	20		Ribbon winder			
	806	6		20		Fixture retract			
	810	6		45		Body put on			
	814	6		28		Fixture retract			
	816	3	1	25		Ribbon winder			
	818			31	ppm				
	819	6		25		Fuze feed			
	822	6	1	17		Add clips			
	826	6		40		Fuze feed			
	829	6		40		Fuze feed			
	834	3		48		Washer feed			
	835	3		15		Washer feed			
	837	6		30		Fixture retract			
	841	3		25		Washer feed			
	841	6		50		Fuze feed			
	844	6		60		Fuze feed			
	848	3		25		Washer feed			

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

ORDAR-QA FORM 490

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE	B-4, LSAAP	OPERATION				PROCESSED		POUNDS	
		PAGE <u>3</u> or <u>10</u>	STATION NO.	TIME		END OF SHIFT	TIME	RATE	PARTS
				START OF SHIFT	SEC.				OTHER
DATE	EVENT TIME	EVENT CODE	MIN.	SEC.					REJECTS
8/17/82	850	6			35	Body Placement			
	851	6			45	Body Placement			
	852	6	2		33	Out of clips			
	855	3			50	Clip placer			
	856	3	2		25	Clip placer			
	859	6			47	Fixture not going into station			
	801	6			92	Fuze feed			
	904	3			40	Washer feed			
	905	6			45	Grenade conveyor belt loose			
	907	6	2		00	Fuze feed			
	909	6			20	Fuze feed			
	910	6			30	Grenade conveyor			
	910	6			70	Fuze feed (BOH came loose)			
	913	6	3		20	Fuze feed (BOH came loose)			
	916	6			20	Fuze feed			
	916	6	13		36	Fuze feed (BOH came loose)			
	929	2	16		00	Break			
	945	6			65	Fuze feed			

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE M.
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE R)
7. ARRADCOM RESERVED

PRINTED NAME

R.A.M. DATA

PLACE <u>4</u> or <u>10</u>	OPERATION B-4, LSAAP	XM77 Grenade/Fuze Assembly				PROCESSED		POUNDS	
		STATION NO.	TIME		TIME	RATE	ACCEPT	REJECTS	PARTS OTHER
DATE	EVENT TIME	EVENT CODE	START OF SHIFT	END OF SHIFT					M P EQUIPMENT FAILURE CODE
8/17/82	947	6			65	Fuze feed			
	949	6			85	Fuze feed			
	950	6			42	Fuze feed			
	952	6			37	Fuze feed			
	953	3			43	Washer feed			
	956	6			80	Fuze feed			
	957				31	DDM			
	1000	6			35	No fixtures (operator)			
	1001	6			20	No fixtures (operator)			
	1002	3			90	Ribbon winder			
	1003	3			25	Ribbon winder			
	1005	3			65	Ribbon winder			
	1006	3			50	Ribbon winder			
	1008	6			30	No fixtures (operator)			
	1010	6			20	No fixtures (operator)			
	1013	6			21	No fixtures (operator)			
	1015	6			25	Add clips			
	1019	3	1	78		Ribbon winder #3			

EVENT CODES
1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRACOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE _____
PRINTED NAME _____

R.A.M. DATA

PLACE	STATION NO.	OPERATION		PROCESSED		PARTS OTHER	POUNDS
		TIME	TIME	RATE	ACCEPT		
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS		MP	EQUIPMENT FAILURE CODE
			MIN. SEC.				
8/18/82	1025	3	1	55	Ribbon winder		
	1031	6		80	Add clips		
	1034	6		57	Add clips		
	1035	6		20	Fixture retract		
	1037	6		46	Fuze feed		
	1038	3		30	Ribbon winder		
	1042	3	1	60	Clip feed		
	1043	6	2	62	Fuze feed		
	1046	6		45	Fixture retract		
	1048	6		30	Fixture low (operator)		
	1053	6		40	Fixture low (operator)		
	1055	6		15	Fixture low (operator)		
	1056	6		21	Fixture low (operator)		
	1057	6		60	Fuze feed		
	1058	6		52	No ribbon on fixture (operator)		
	1102	6		20	Fixtures low (operator)		
	1103	6		68	Fuze feed		
	1105	3		70	Clip feed		

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST
5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

ORDAR-QA FORM 48

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE	STATION NO.	OPERATION			PROCESSED			POUNDS		
		TIME		END OF SHIFT	TIME		RATE	ACCEPT	PARTS	OTHER
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS		M P	EQUIPMENT FAILURE CODE			
MIN.	SEC.									
8/17/82	1110	6	20	Fixture low (operator)						
	1110	3	25	Washer feed						
	1112	3	1	Clip feed						
	1115	6	40	Bad part						
	1116	6	20	Fuze tied						
	1117	3	35	Clip feed						
	1120	6	20	Out of fixtures (operator)						
	1122	3	70	Tape winder						
	1125	6	80	Fuze feed						
	1130	2	30	00		Lunch				

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE

6. ADMINISTRATIVE (STATE REASON)
7. ARADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE

PRINTED NAME

R.A.M. DATA

PLACE	OPERATION			PROCESSED			POUNDS PARTS OTHER
	B-4	LSAAP	XMT77 Grenade/Fuze Assembly	TIME	TIME	RATE	
PAGE <u>7</u> or <u>10</u>	STATION NO.	START OF SHIFT	END OF SHIFT				REJECTS
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS	M P	EQUIPMENT FAILURE CODE	
			MIN. SEC.				
8/17/82	1202	3	14 00	Clip feed			
	1218	6	25	Fixture retract station			
	1226	6	25	Fixture retract station			
	1231	3	20	Cleared clip feed			
	1234	6	40	Grenade turned over at take off			
	1235	6 1	30	Fuze feed, (fuze gaging)			
	1240	6	20	To allow buggies of grenades and tow motor to go through Bay.			
	1242	6	25	Spiral pin bent on fuze (bad part)			
	1243	6	55	Fixture without ribbon (operators fault)			
	1244	6	25	Fixture without ribbon (operators fault)			
	1248	6	25	Fuze feed			
	1249	6	25	Fixture retract station			
	1257	6	40	Added clips			
	1300	6	15	Fixture retract station			
	1303	6	15	Fixture retract station			
	1309	6	25	Fixture retract station			
	1309	6	25	Fixture retract station			
	1315	6	50	Fixture retract station			

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRADCOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE _____

PRINTED NAME _____

R.A.M. DATA

PLACE PAGE <u>8</u> OR <u>10</u>	STATION NO.	OPERATION			PROCESSED		POUNDS PARTS OTHER
		TIME	START OF SHIFT	TIME	RATE	ACCEPT	
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS		EQUIPMENT FAILURE CODE	
MIN.	SEC.			MIN.	SEC.		
8/17/82	1316	3		70		Clip feed station	
	1324	6		20		Fixture retract station	
	1325	6		95		Added clips	
	1329	6		30		Fixture retract station	
	1330	2	15	00		Break	
	1350	6		20		Fuze feed	
	1351	6		40		Fuze feed	
	1353	3		50		Washer feed	
	1358	6		40		Loose ribbon on conveyor	
	1400	6		35		Fixture retract station	
	1405	3		45		Winder feed loose	
	1406	6		75		Fuze feed	
	1407	6		40		Fuze feed	
	1411	6		45		Fixture retract station	
	1415	3		65		Clip station	
	1419	6	8	70		Fuze feed (magnetic bar transfer) logic problem	
	1429	6	4	65		Fuze feed (magnetic bar transfer) logic problem	
	1434	6	1	35		Fuze feed (magnetic bar transfer) logic problem	

EVENT CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE
6. ADMINISTRATIVE (STATE REASON)
7. ARRACOM RESERVED
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

ORDAR - QA FORM 438

SIGNATURE _____

PRINTED NAME _____

R.A.M. DATA

PLACE B-4	LSAAP	OPERATION			PROCESSED		POUNDS	
		PAGE <u>9</u> OR <u>10</u>	STATION NO.	TIME	TIME	RATE	ACCEPT	PARTS OTHER
DATE	EVENT TIME	EVENT CODE	DURATION	REMARKS		EQUIPMENT FAILURE CODE		
MIN.	SEC.							
8/17/82	14 36	6	4	30	Fuze feed (magnetic bar transfer)	logic problem		
	14 41	6	1	55	Fuze feed (magnetic bar transfer)	logic problem		
	14 43	6		45	Fixture retract station			
	14 43	3		40	Clip feed			
	14 46	6		55	Clip supply			
	14 48	3		25	Clip feed			
	14 50	3		40	Clip feed			
	14 51	6		20	Fixture retract station			
	14 52	6		25	Fixture retract station			
	14 54	6		25	Fuze placing station			
	14 58	6		30	Fixture retract station			
	15 03	3		25	Clip feed			
	15 05	3		85	Clip feed			
	15 06	3		30	Clip feed			
	15 06	3		40	Clip feed			
	15 07	6		85	Supply clips			
	15 08	3		60	Clip feed			
	15 08	3		30	Clip feed			

EVENT
CODES

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE

6. ADMINISTRATIVE (STATE REASON)
7. ARRADM RESERVE
8. OPERATIONAL DOWNTIME (TOOL CHANGE)

SIGNATURE _____
PRINTED NAME _____

R.A.M. DATA

EVENT
COORDINATOR

1. END OF SHIFT
2. BREAK/LUNCH
3. CORRECTIVE MAINTENANCE
4. END OF TEST

5. PREVENTIVE MAINTENANCE

NATURE

PRINTED NAME